

REMARKS

In the Office Action, claims 30-52 were rejected and claims 1-29 and 53 were withdrawn from consideration. By the present response, claims 30, 34, 36-39, 43, 46 and 49 are amended, claims 1-29, 31 and 53 are canceled, and new claims 54 and 55 are added. Upon entry of the amendments, claims 1-30, 32-52, 54 and 55 will be pending in the present patent application. Reconsideration and allowance of all pending claims are requested.

Affirmation of Election

Applicants hereby affirm the earlier telephone election summarized by the Examiner.

Rejections Under 35 U.S.C. § 112

The Office Action indicated claim 43 as being rejected under 35 U.S.C. §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicant regards as the invention. Particularly, the Office Action indicates that claim 43 is in improper form for a Markush claim.

Applicants respectfully submit that claim 43 has been amended to correct the claim language and put the claim in proper form. Additionally, claims 34, 36, 37, 39, 46 and 49 have also been amended to make similar changes to the claim language.

Rejections Under 35 U.S.C. § 102

In the Office Action, claims 30, 31, 35, 38, 40, 42-48, 50 and 51 are rejected under 35 U.S.C. §102(b) as being anticipated by U.S. Patent No. 5,973,444 (hereinafter “Xu”).

Xu fails to teach an epitaxial buffer layer

Independent claim 30 recites a field emission device. The device includes a substrate having a top and an opposite bottom side. The device further includes an epitaxial buffer layer affixed to the top side of the substrate, a dielectric layer disposed on the top side, a conductive layer disposed on top of the dielectric layer opposite the substrate, such that the conductive layer and the dielectric layer define a cavity extending downwardly to the substrate. Further, the device includes at least one nanorod affixed to the substrate via the epitaxial buffer layer and substantially disposed within the cavity.

Independent claim 30 and claims depending therefrom

Applicants respectfully submit that Xu fails to teach a structure that is analogous to the epitaxial buffer layer employed in the field emission device. Even if the resistor layer in Xu is located similarly to the claimed epitaxial buffer layer, the inherent properties of the two layers will be different due to important differences in their material properties. In particular, the resistor layer in Xu is formed of *amorphous silicon carbide*, whereas the buffer layer of the present application is *epitaxial* in nature. As will be appreciated, an epitaxial layer is a single crystal layer formed on top of a single crystal substrate. Therefore, the buffer layer in the claims includes a crystalline material as opposed to the resistor layer in Xu, which includes an amorphous material. For example, in a passage at paragraph 44, lines 5-9, the present application teaches the use of various crystalline materials for the buffer layer. The cited passage reads:

The buffer layer 211 could include, for example, germanium carbide or silicon carbide applied in an epitaxial process, or a polycrystalline diffusion barrier such as W or Ti-W. In some cases the buffer layer 211 should be suitable to support epitaxial growth of the nanostructure materials of interest. In other cases, epitaxy may not be necessary.

Xu fails to disclose, teach or even suggest any indication of employing a crystalline material for the resistor layer. In fact, as indicated above, quite the opposite, Xu suggests employing an amorphous silicon carbide for the resistor layer. In view of at least these distinctions, Xu cannot anticipate independent claim 30 and claims depending therefrom.

Independent claim 38 and claims depending therefrom

Independent claim 38 recites a nanostructure having an inorganic substrate. The substrate includes a top side and a bottom side. The nanostructure further includes an epitaxial conductive buffer layer disposed adjacent to the top side, and a plurality of elongated carburized metal nanostructures extending from the epitaxial conductive buffer layer.

As discussed with reference to the field emission device in independent claim 1, the nanostructure of claim 38 includes an epitaxial buffer layer. However, the structure of Xu does not include an epitaxial or crystalline resistor layer. Therefore, Xu cannot anticipate independent claim 38 and claims depending therefrom.

Xu fails to teach a conductive platform

Independent claim 44 and claims depending therefrom

In the Office Action, claim 44 was rejected for the same reasons as claims 30 and 38. The Examiner did not mention any specific reasons for rejection of claim 44.

Claim 44 recites a field emission device. The device includes a substrate having a top side and an opposite bottom side, a dielectric layer disposed on the substrate, a conductive layer disposed on top of the dielectric layer. The conductive layer and the dielectric layer define a cavity extending downwardly to the substrate. The device further includes a conductive platform, having a top surface, disposed on the top side of the substrate within the cavity, and at least one nanorod affixed to the top surface of the conductive platform and substantially disposed within the cavity.

As disclosed in a paragraph 47, lines 1-8 the Application, the conductive platform facilitates the growth of the nanorods. The cited passage reads:

In another embodiment, a conductive platform 420, as shown in FIG. 4, may be disposed on the substrate 310 within a cavity formed in the dielectric layer 314. At least one channel 402 is formed in the conductive platform 420 and a catalyst particle 404 is placed within the channel 402. Nanorods 418 are then grown so as to extend from the top surface of the conductive platform 420. The conductive platform 420 may be made of a material such as silicon or molybdenum. In one embodiment, the conductive platform 420 is a conic-shaped member having a relatively large bottom surface opposite the top surface.

Applicants respectfully submit that Xu does not teach or suggest any structure analogous to the conductive platform as recited in claim 44. In other words, Xu fails to teach or suggest any structure which is employed to raise the level of nanorods close to the gate opening. Therefore, Applicants submit that independent claim 44 is allowable, and respectfully request the Examiner to reconsider the rejection of the claim. In response to the rejection of claims depending from the independent claim 44, it is respectfully submitted that insomuch as independent claim 44 is allowable, claims depending therefrom are allowable at least by virtue of their dependence on an allowable base claim.

Rejections Under 35 U.S.C. § 103

The Office Action summarizes claims 30 and 32 as rejected under 35 U.S.C. §103(a) as being unpatentable over Xu in view of U.S. Patent No. 5,157,304 (hereinafter “Kane”). Further, the Office Action summarizes claims 30 and 33 as rejected under 35 U.S.C. §103(a) as being unpatentable over Xu in view of U.S. Patent No. 6,054,801 (hereinafter “Hunt”). Also, the Office Action summarizes claims 30 and 34 as rejected under 35 U.S.C. §103(a) as being unpatentable over Xu in view of U.S. Patent No. 6,465,132 (hereinafter “Jin”) and in further view of U.S. Patent No. 6,911,767

(hereinafter “Takai”). Furthermore, the Office Action summarizes claims 30, 37, 44 and 52 as rejected under 35 U.S.C. §103(a) as being unpatentable over Xu in view of U.S. Patent No. 6,376,007 (hereinafter “Rowell”). Still further, the Office Action summarizes claims 38 and 41 as rejected under 35 U.S.C. §103(a) as being unpatentable over Xu in view of U.S. Patent No. 6,586,093 (hereinafter “Laude”).

Applicants respectfully submit that Xu fails to teach or suggest an epitaxial buffer layer, or a conductive platform. The secondary references do not obviate the deficiencies of Xu. Hence, the combinations of Xu with either Kane, Hunt, Jin, Takai, Rowell or Laude fail to establish a *prima facie* case of obviousness. Therefore, Applicants request the Examiner to withdraw the rejections of these claims.

New Claims 54 and 55

Applicants respectfully submit that new claims 54 and 55 have been added by the present Response. The new claims are also intended to capture the subject matter believed to be allowable. Consideration and allowance of the new claims are requested.

Claims 54 and 55 recite subject matter similar to that of original claim 30 and 38, respectively, but recite a polycrystalline diffusion barrier as described in paragraph 44 of the application. Claims 54 and 55 are considered to be allowable because Xu does not teach or suggest such a diffusion barrier.

Conclusion

In view of the remarks and amendments set forth above, Applicants respectfully request allowance of the pending claims. If the Examiner believes that a telephonic interview will help speed this application toward issuance, the Examiner is invited to contact the undersigned at the telephone number listed below.

Respectfully submitted,

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Patrick S. Yoder
Reg. No. 37,479
FLETCHER YODER
P.O. Box 692289
Houston, TX 77269-2289
(281) 970-4545